Office de la Propriété Intellectuelle du Canada
Un organisme d'Industrie Canada

Canadian Intellectual Property Office
An agency of Industry Canada

CA 2228749 C 2001/10/09

(11)(21) 2 228 749

(12) BREVET CANADIEN
CANADIAN PATENT

(13) C

(86) Date de dépôt PCT/PCT Filing Date: 1996/08/12
(87) Date publication PCT/PCT Publication Date: 1997/02/27
(45) Date de délivrance/Issue Date: 2001/10/09
(85) Entrée phase nationale/National Entry: 1998/02/05
(86) N° demande PCT/PCT Application No.: US 96/13141
(87) N° publication PCT/PCT Publication No.: WO 97/07030
(30) Priorités/Priorities: 1995/08/18 (08/516,913) US; 1996/04/30 (08/641,213) US

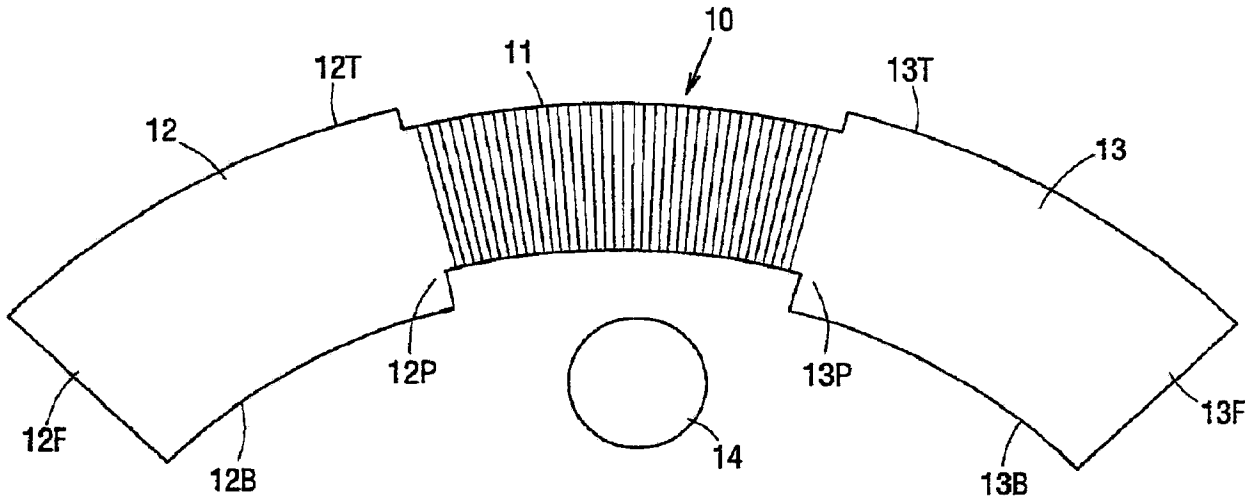
(51) Cl.Int.^{6}/Int.Cl.^{6} B65D 3/22

(72) Inventeurs/Inventors:
SADLIER, Claus E., US;
VARANO, Richard, US

(73) Propriétaire/Owner:
INSULAIR, INC., US

(74) Agent: GOWLING LAFLEUR HENDERSON LLP

(54) Titre : TASSE ISOLEE A COUCHES MULTIPLES FABRIQUEE A PARTIR D'UNE FEUILLE PLIEE
(54) Title: MULTI-LAYERED INSULATED CUP FORMED FROM FOLDED SHEET



(57) Abrégé/Abstract:
An elongated sheet (10) is used to form a thermally insulated cup (30). The sheet includes a pair of spaced apart smooth portions (12, 13) connected by a middle portion (11). The smooth portions are folded on opposite sides of the middle portion. The middle portion is corrugated, otherwise distorted, or deformed to create an insulating air space. Ends of the smooth portions are joined together and a bottom closure (14) is attached. The finished cup includes a smooth outer shell (12S), a smooth inner shell (13S), and a middle layer (11L) sandwiched therebetween. In an alternative embodiment (Fig 5A), the blank may have the insulating portion (34) at one end instead of the middle, and it is suitably folded so that the insulating layer comes out as a middle layer (Fig 6A). In another embodiment, the blank has just two sections (Fig 7A) and is formed so that the cup has an outer corrugated layer (34) and an inner smooth layer (32).

Abstract

An elongated sheet (10) is used to form a thermally insulated cup (30). The sheet includes a pair of spaced apart smooth portions (12, 13) connected by a middle portion (11). The smooth portions are folded on opposite sides of the middle portion. The middle portion is corrugated, otherwise distorted, or deformed to create an insulating air space. Ends of the smooth portions are joined together and a bottom closure (14) is attached. The finished cup includes a smooth outer shell (12S), a smooth inner shell (13S), and a middle layer (11L) sandwiched therebetween. In an alternative embodiment (Fig 5A), the blank may have the insulating portion (34) at one end instead of the middle, and it is suitably folded so that the insulating layer comes out as a middle layer (Fig 6A). In another embodiment, the blank has just two sections (Fig 7A) and is formed so that the cup has an outer corrugated layer (34) and an inner smooth layer (32).

Multi-Layered Insulated Cup Formed From Folded Sheet

Background—Cross-Reference To Related Case

This invention is an improvement upon that of U.S. patent 5,363,982 to C. E. Sadlier, granted 15 Nov 1994.

Background—Field of Invention

This invention relates generally to disposable containers, specifically to an insulated cup made of sheet material.

Background—Prior Art

There are three main types of disposable cups now in use: polystyrene, expanded resin, and paper.

Polystyrene cups are aesthetically pleasing, but they can be used only for holding cold drinks, and are not biodegradable or easily recyclable.

Cups of expanded synthetic resin material, sold under the trademark Styrofoam, are excellent thermal insulators, so that they can maintain the temperature of a drink, whether hot or cold, for long periods of time. They are comfortable to handle because their exteriors stay close to ambient temperature, regardless of the temperature of the drink. However they are environmentally unfriendly because they are not biodegradable or easily recyclable. As a result, they are being banned from many municipalities.

Standard single-layer paper cups are recyclable and biodegradable and therefore more environmentally sound. However they are poor thermal insulators, so that a beverage in a paper cup quickly warms (if cold) or cools (if hot). They are also uncomfortable to handle because a hot or cold drink can burn or uncomfortably cool a hand. Also a cold drink will cause condensation to appear on the outside, making a paper cup slippery and difficult to hold. Their single-layer construction makes them fragile, so that large cups filled with liquid easily crumble after prolonged handling.

Multi-layered paper cups have been designed for providing thermal insulation and increased strength. U.S. patents 2,661,889 to Phinney (1948), 4,993,580 to Smith (1991), 5,092,485 to Lee (1992), and 5,205,473 to Coffin (1993) show three-layered cups with smooth outer and inner shells, and a corrugated middle layer. The corrugated layer provides air pockets or

spaces for thermal insulation and added strength to withstand prolonged handling.

Although strong and thermally efficient, these cups are all expensive and impractical to manufacture because their three layers are formed separately and then assembled together. This requires at least three adhesive joints for the forming the layers into tapered cylinders (conoids), two adhesive joints for assembling the layers together, and an adhesive joint for attaching the bottom. Some cups require even more adhesive joints. The liberal use of glue renders the cups difficult or impossible to recycle. The layers are usually formed from blanks cut separately from sheets, so that they do not make the most efficient use of paper and machinery time. Furthermore, the extra steps slow the production process, prevent the cups from being made on standard, existing cup-forming machinery. Also they increase manufacturing overhead and direct labor allocation, so that the prior-art cups are expensive. As a result, these cups have never achieved commercial success.

Although similar in its multilayered design, conventional corrugated boxboard also has never achieved commercial success for use in forming cylindrical drinking cups because its layers are permanently fixedly adhered to one another. This makes it physically impracticable to bend or wrap boxboard into a smooth cylindrical shape.

Often establishments selling very hot or cold beverages in paper cups will use double or nested cups to avoid the above problems of single paper cups, but doubling cups is time consuming and expensive.

The above Sadlier patent discloses a three-layered cup having smooth outer and inner layers and a corrugated middle layer, all formed of one continuous sheet wound in a spiral. Although more economical to manufacture than prior-art cups, this cup preferably is made by unidirectionally winding three layers on a spinning mandrel. It therefore cannot be readily manufactured by existing mass production cup-forming machinery, which typically wraps a cup's sidewall blank vertically into a cylindrical shape, around a non-spinning mandrel.

Objects and Advantages

Accordingly, several objects and advantages of the invention are to provide a cup which is thermally insulating for comfortable handling and for maintaining the temperature of its contents, which is sturdy enough to withstand prolonged handling, which can be made of

biodegradable and recyclable materials, which is easy and inexpensive to manufacture, and which can be made by existing machinery.

Other objects are to provide an insulated cup which is simpler in construction, which is more economical to fabricate, which can be fabricated in a variety of ways, which does not require unidirectional winding on a spinning mandrel.

Further objects and advantages will become apparent from a study of the following description and the accompanying drawings.

Summary

In accordance with one embodiment of the present invention, a thermally insulated cup is formed from one continuous, homogeneous sheet of paper having two spaced-apart smooth end or outer portions connected by a corrugated middle portion. The smooth end portions are folded over opposite sides of the corrugated portion. The folded sheet is wrapped or bent around a mandrel to form cylindrical inner and outer shells that sandwich the corrugated portion therebetween. The ends of each smooth portion are sealed together. A bottom closure is attached to the inner shell. The resulting three-layered cup is strong, offers good thermal insulation for comfortable handling and for maintaining the temperature of its contents, and can be formed on existing machinery. Alternatively the continuous sheet may be formed of separate sections which are adhered together. Further, the corrugated or otherwise insulating portion can be an outer, rather than a middle, portion. Moreover the starting sheet can have two portions, so that after folding, it is wrapped into a two-layered insulated cup, with the corrugated layer on the outside.

Drawing Figures

Fig 1A is a plan view showing the components, in blank sheet form, for making a three-layered insulated cup employing a one-piece side component having a middle corrugated section, in accordance with one embodiment of the invention.

Fig 1B is an edge view of the blank sheet components of Fig 1A.

Fig 1C is a plan side view similar to Fig 1A, but where the side component is initially in three parts.

Fig 2A is an enlarged edge view of the side component of Fig 1A after folding, a stage in

manufacturing.

Fig 2B is a top view of the side component after wrapping into a cylindrical shape, another stage in manufacturing.

Fig 3 is an enlarged top sectional view of the finished cup.

Fig 4 is an enlarged side sectional view of the finished cup.

Fig 5A is a plan view of a blank sheet for making a three-layered insulated cup employing a one-piece side component having an end corrugated section, in accordance with another embodiment of the invention.

Fig 5B is an edge view of the blank sheet of Fig 5A.

Fig 5C is a plan side view similar to Fig 5A, but where the side component is initially in two parts.

Fig 6A is an edge view of the side component of Fig 5A after folding.

Fig 6B is a top view of the side component of Fig 5A after wrapping into a cylindrical shape.

Fig 7A is a plan view of a blank sheet for making an insulated two-layered cup employing a one-piece side component having an end corrugated section, in accordance with yet another embodiment of the invention.

Fig 7B is an edge view of the sheet blank of Fig 7A.

Fig 8A is an edge view of the side component of Fig 7A after folding.

Fig 8B is a top view of the side component of Fig 5A after wrapping into a cylindrical shape.

Fig 9 is an edge view of an alternative-insulating layer employing spaced grooves.

Drawing Reference Numerals

10. Continuous Sheet
11. Corrugated Portion
11L. Corrugated Layer
12. First Smooth Portion
12B. Bottom Edge
12F. Free End
12P. Proximal End
12S. Outer Shell

12T. Top Edge
13. Second Smooth Portion
13B. Bottom Edge
13F. Free End
13P. Proximal End
13S. Inner Shell
13T. Top Edge
14. Bottom Closure
14R. Bottom Closure Rim
15. Air Pockets
16. Waterproof Coating
17. Reflective Coating
20. Continuous Sheet
21. Corrugated Piece
22. Smooth Piece
23. Smooth Piece
24. Bottom Closure
30. Cup
31. Mandrel
32. Middle Section
34. Right Section
36. Fold Line
38. Flat Sheet
40. Score

Figs. 1A to 1C—Sheet Blanks

In accordance with a first embodiment of the invention shown in Fig 1A, a cup or container (Fig 4) begins as a continuous, homogeneous sheet 10, which is die cut from a larger sheet (not shown) of paper or another suitable sheet material. Sheet 10 includes an arc-shaped corrugated middle portion 11, and two longer, arc-shaped, first and second smooth end or outer portions 12 and 13, respectively, extending from the ends of corrugated portion 11. Smooth portions 12 and 13 have proximal ends 12P and 13P, respectively, free ends 12F and 13F, top edges 12T and 13T, and bottoms edges 12B and 13B. A round, bottom closure 14 is cut separately. The corrugations in portion 11 are clearly shown in the edge view of Fig 1B. They are formed by methods well known in the art and are shown as having sharp folds, but alternatively can have rounded bends or bight portions.

In accordance with a second embodiment of the invention shown in Fig 1 C, a continuous sheet 20 is formed by gluing the appropriate edges of a corrugated piece 21 to separate smooth pieces 22 and 23. Bottom closure 24 is also cut separately. Corrugated piece 21 is slightly longer than corrugated portion 11 shown in Fig 1A, so that its ends slightly overlap smooth pieces 22 and 23 for gluing. Cutting the three pieces separately may allow multiple types of sheet material to be used in fabricating sheet 20. E.g., recycled paper can be used for corrugated piece 21 and a type of paper known as SBS (solid bleach sulfite) can be used for smooth pieces 22 and 23.

In both embodiments (Figs. 1A and 1B, as well as Fig 1C), the corrugated middle portion (11 or 21) has a slightly lesser height than the end or outer portions, for a reason to be described.

Sheet 10 may be coated on at least one side with a waterproof coating. Some coatings, such as polyethylene, also serve as an adhesive when heated.

Figs. 2A and 2B—Folding and Wrapping

The cup (Fig 3) is formed as follows: Smooth portions 12 and 13 are folded on opposite sides of corrugated portion 11, as shown in Fig 2A. Sheet 10 then consists of a flat three-layered arrangement, with a corrugated layer or portion sandwiched between the smooth outer layers or portions. Smooth portions 12 and 13 are longer than corrugated portion 11, so that their free ends 12F and 13F, respectively, extend beyond the ends of corrugated portion 11. A weak adhesive or tack, such as weak glue, elastic glue, or heated polyethylene may optionally be used to hold the folded, three-layered sheet flat until it is wrapped and sealed (described in the next paragraph). The adhesive may be applied by die cutting a small hole 50 (Figs 11A or 11B) in the middle layer so that a single drop of adhesive can be inserted to glue the inner and outer layers together without adhering the middle layer. This arrangement may make wrapping easier. The dimensions of the portions are selected according to the size of the cup being produced.

Sheet 10 is then wrapped around a tapered mandrel 31, as shown in Fig 2B. The inner smooth layer is then completed by gluing or otherwise joining or sealing the excess portion at free end 13F to proximal end 13P through the application of a cold adhesive, or through the use of heated polyethylene. Similarly the outer smooth layer is then completed in a similar manner by gluing or heat sealing free end 12F to portion 12.

Figs. 3 and 4—Sectional Views

Tapered cylindrical inner shell 13S and outer shell 12S are thus formed and sealed, as shown in the top sectional view in Fig 3. Corrugated portion 11 (Fig 2B) is sandwiched between the shells to form a corrugated middle, insulating layer 11L. A bottom closure 14 is attached within inner shell 13S, as will be explained in conjunction with Fig 4.

Smooth portion 12 (Fig 2A) is longer than smooth portion 13 (Fig 2A), so that after they are formed into conoids, outer shell 12S is larger in diameter than inner shell 13S for

accommodating the thickness of corrugated layer 11L. Although sheet 10 is used in this example, sheet 20 (Fig 1C) can also be used.

As thus constructed, corrugated layer 11L forms many thermally insulating air spaces 15 between it and the shells. If the cup is made with polyethylene-coated paperboard, it already has waterproofing material on it. Otherwise, it is coated with a suitable waterproofing material 16, such as plastic or wax. The inside surface of middle layer 11L is optionally coated with a reflective material 17. This will reflect radiant heat back to its source, whether from the cup's contents or from the air outside the cup, so that thermal efficiency is further improved. Because the three layers of the cup are constructed by simply folding and winding sheet 10 (Fig 1A), it is very easy and economical to manufacture.

As shown in the side sectional view of Fig 4, cup 30 includes three layers formed from outer shell 12S, corrugated layer 11L, and inner shell 13S. Top edges 12T and 13T are crimped together and rolled outwardly to form a rim. Bottom edges 12B and 13B are folded inwardly, and sealed to the inside of a rim 14R on bottom closure 14 for a watertight seal. Because corrugated portion 11 (Fig 1A) is narrower than smooth portions 12 and 13 (Fig 1A), the top and bottom edges of corrugated layer 11L stay clear of the crimped top and bottom of cup 30.

Figs 5A To 6B—Corrugated Portion At End

In lieu of providing the corrugated portion in the middle of the starting blank, as shown in Fig 1A, the corrugated portion may be provided at one end of the starting blank, as shown in Figs 5A and 5B. Here the starting blank has three sections: a left end section 12, a middle section 32, a corrugated right end section 34. Left section 12 is identical to that of Fig 1A. Middle section 32 is identical to end section 13 of Fig 1A, but is now adjacent and continuously integral homogeneous with left end section 12. Corrugated right end section 34 is identical to corrugated middle section 11 of Fig 1A, but is now at one end instead of in the middle. As with Figs 1A and 1C, the corrugated section of Fig 5A (and the remaining figures) is tapered, like the smooth sections. The blank is continuous, integral, and homogeneous, with sections 12 and 32 being smooth and distinguished or separated by a broken fold line 36. Section 34 is corrugated or scored (see discussion of Fig 9 infra) by a standard die-cutting operation (not illustrated). The entire blank preferably is die cut from a larger starting sheet. Except for the above-noted distinguishing features, the blank of Figs 5A and 5B is similar to the blank of Fig 1A.

While Fig 5A shows a single continuously integral starting blank, the starting blank may be formed from two separate portions, as shown in Fig 5C. One portion, consisting of left end section 12 and middle section 32, is smooth and continuously integral or homogeneous, and the other portion, consisting of corrugated or otherwise insulating portion 34', is separate and is formed separately. Then the two separate portions of Fig 5C are glued together (operation not illustrated) along the leftmost one of the sections of the corrugated portion to form a blank similar to that of Fig 5A. As stated above, cutting the two pieces separately may allow multiple types of sheet material to be used in fabricating sheet 20. E.g., recycled paper can be used for corrugated piece 34 and SBS can be used for smooth pieces 12 and 32.

The blank of Fig 5A (or Fig 5C after gluing) is then folded a first time so that corrugated section 34 is adjacent and parallel to middle, smooth section 32. Left end portion 12 is then folded over the corrugated portion so that all three sections are parallel and the corrugated portion is sandwiched between the two smooth portions, as shown in Fig 6A. In lieu of gluing section 34' along the edge of section 32 and folding section 34' inwardly, section 34' may be disposed on section 32 in a centered position, thereby requiring only that section 12 be folded over. Then the folded blank is wrapped or bent around a mandrel (not shown) to form a conoid, as shown in Fig 6B. The ends of the blank are the sealed together, as with the embodiment of Fig 4, the bottom (not shown) of the cup is attached in a similar manner, and it is finished in the same manner as with Fig 4. A cup made from the conoid of Fig 6B has all of the advantages of the cup of Fig 4. It can be fabricated from a blank (Fig 5A) in which the corrugated section is at one end, rather than in the middle, thereby providing an alternative starting blank.

Figs. 7A To 8B—Two-Layered Cup

Cups formed from the container blanks shown in Figs 7A to 8B are similar to cups of the previous embodiments, but have sidewalls which include two layers instead of three and are thus are more economical and simpler to fabricate.

As shown in Figs 7A and 8B, the sidewall blank includes a substantially flat or smooth left section 32, and a right corrugated section 34, both of which are substantially identical to their respective counterparts shown in Fig 5A. The two sections may be formed as a homogenous piece as shown in 5A or of two separate pieces (not shown) which are glued together form a

unitary strip of deformable sheet material as shown in Fig 7A.

The top and bottom edges of the blank, indicated at 13T and 12B, respectively, have an arcuate configuration and a common center of curvature, substantially as shown in Fig 7A.

The illustrated strip (Figs 7A and 7B) is folded once along a common fold line at the junction of sections 32 and 34. This brings the two sections into face-to-face engagement with each other to form a multi-layered container sidewall blank. The blank has an end portion at the left end of the blank defined by the common fold line and another end portion at the right end of the sidewall blank formed by the free ends of sections 32 and 34. The integral corrugations formed in section 34 define depressions in the face of this section. These depressions cooperate with the associated face of section 32 when the two sections are brought together in face-to-face relation to each other to form a plurality of air spaces between sections or layers 32 and 34 which comprise the two-layered blank shown in Fig 8A.

The sidewall blank (Fig 8A) is then wrapped around a mandrel (not shown) to bring the opposite end portions of the blank into overlapping relation to each other. Thus, as shown in Fig 8B, the free end portions of sections or layers 32 and 34 are brought into overlapping relation with a marginal portion of the opposite or folded end of the blank. The overlapping portions are joined to each other to form a continuous container sidewall, such as generally shown in Fig 8B. This joining operation forms the side seam of the cup and is performed while the cup sidewall blank is supported on the mandrel, in a manner well known in the cup and container making art.

The shape of the mandrel used to form the container will vary and will be determined by the shape of the container to be formed. The folded sidewall blank formed from the flat strip shown in Fig 7A is particularly adapted for use in making a cylindrical paper cup having a substantially circular cross section throughout its height. Therefore a cylindrical mandrel will be employed for making such a cup.

In accordance with the presently preferred cup construction, smooth layer 32 forms the inner surface of the cup, whereas corrugated layer 34 defines a portion of the exterior surface of the container.

While the container sidewall blank remains in position on the mandrel, the bottom of the cup

is attached to the sidewall by a rolling or crimping operation and a bead is preferably rolled around the upper end of the cup sidewall blank to complete cup assembly.

Fig 9—Alternative Insulating Layer

In lieu of a corrugated insulating layer, the insulating layer in any embodiment may be made of a flat sheet 38 (Fig 9). This sheet has spaced grooves or scores 40 formed in one surface and separated by flat portions on the one surface of the sheet, i.e., the outer surface as shown in Fig. 9. The corresponding protrusions or integral ribs produced by forming these grooves extend down from the lower face of the sheet, as shown in Fig 9. When the ribs on the lower face of the scored layer 38 are brought into face-to-face engagement with an associated face of a smooth layer, air spaces are created between the ribs and provide effective insulation. Preferably the grooves or scores are about 5 to 10 mm apart and are about 1-3 mm deep. The scores are formed or embossed into the surface of the sheet by a die, which displaces the sheet material to create the indentations. Preferably the sheet in Figs 1A, 5A or 7A is cut and scores 40 are simultaneously formed in a single blanking operation. Also the sheet is preferably oriented so that the lands face the inside of the container, but the opposite arrangement can also be used.

The ribs formed by scores 40 preferably extend in radial directions transversely across the blank, as illustrated in Fig 7A, for example, and have a single center of radiation which is substantially coincident with the center of curvature of the arcuate top and bottom edges of the blank, substantially as shown.

Conclusions, Ramifications, and Scope

Accordingly the reader will see that we have provided several embodiments of thermally insulated cups or containers which will maintain the temperature of their contents much longer than non-insulated cups. When any container is holding a hot or a cold beverage, it will maintain its outer shell at close to ambient temperature, so that it will be comfortable to handle. When it is holding a cold beverage, it will also prevent condensation from forming on its outer shell, so that it will not become slippery. The corrugated, multi-layered construction makes it strong enough to withstand prolonged handling. Its paper (or other suitable sheet material) construction and its minimal use of adhesive makes it environmental friendly. Its design allows it to be made of thinner paper and thereby makes very efficient use of paper stock, so that it consumes a minimal amount of natural resources. Because its three or two layers are constructed by simply folding and winding a single sheet of paper in a single

wrapping operation, it can be easily and inexpensively manufactured with existing machinery. Unlike conventional corrugated boxboard, the layers of its folded blank are not permanently fixedly adhered to one another, so it can easily be wrapped into a cylindrical shape prior to sealing.

Although the above description contains many specificities, they should not be considered as limitations on the scope of the invention, but only as examples of the preferred embodiment. Many other ramifications and variations are possible within the teachings of the invention.

For example, instead of paper, other suitable materials, such as biodegradable plastic, if available, other plastic, metal, stiff fiber, etc. can be used. The reflective coating can be eliminated.

The separate elongated pieces shown in Figs 1C and 5C, and used as an alternative to Fig 7A can be crimped instead of glued together. The ends of the middle-corrugated portion (Fig 2B) may be glued or crimped together. The portion used for the smooth outer shell in Figs 1 to 6 may be shorter than the portion used for the smooth inner shell. In this case only the top edge of the inner shell need be rolled outwardly to form the rim, and only the bottom edge of the inner shell need be folded inwardly to seal the bottom. In Fig 5C, corrugated or otherwise insulating portion 34' may be glued in a centered and parallel position on smooth section 32, thereby requiring only that left end portion 12 be folded over the corrugated section to make all three sections parallel.

The construction method of forming a multi-layered cup from a continuous sheet can be used for creating types of insulated containers, such as milk cartons, ice cream cartons, orange juice- or biscuit-type (composite) cans, etc.

The corrugated portion can be formed by die cutting as one or more thin, parallel, spaced strips that connect the two smooth end portions. Instead of vertical corrugations or grooves, the middle layer can employ any other type of distortion, deformation, embossing, or spacing means to create air pockets or spaces between the inner and outer shells. E.g., the insulating layer can use dimples (round or elongated), horizontal or diagonal ridges or ribs, or any other type of distorted sheet material, including porous sheet material, material with holes, or even foamed material, to make it insulating. Instead of the corrugated layer being on the outside as shown in Fig 8B, the layers may be reversed so that the corrugated layer is on the inside and

the smooth layer is on the outside. The corrugated portion can be rectangular, instead of tapered. In this case it can be wrapped around tapered inner shell 13S by spreading or fanning its corrugations wider at its top, or by making the corrugations deeper at the bottom and shallower at the top to convert it into a tapered (cylindrical) shape.

Therefore the scope of the invention should be determined by the appended claims and their legal equivalents, and not by the examples given.

Claims: We Claim:

1. A thermally insulated container comprising:

a multi-layered shell which defines an interior volume, said shell having top and bottom portions, with an opening at said top portion; and

a bottom closure which is attached to said bottom portion;

said shell being formed from a sheet having first and second portions for providing inner and outer layers of said shell, and a third portion which has opposite sides and which defines a middle layer of said shell;

said first and second portions being folded over said opposite sides, respectively, of said third portion, thereby providing said inner and outer layers of said shell, said third portion thereby being sandwiched between said first and second layers for providing said middle layer of said shell;

said third portion having plural deformities formed therein for cooperating with said inner and outer layers when said third portion is sandwiched between said inner and outer layers for providing air space between said inner and outer layers of said shell.

2. The thermally insulated container of claim 1 wherein said first portion, said second portion, and said third portion are all formed of one homogeneous piece of sheet material.

3. The container of claim 1 wherein said first portion, said second portion, and said third portion are all formed of one homogeneous piece of sheet material, and said deformities comprise a plurality of ribs.

4. The container of claim 1 wherein said first portion, said second portion, and said third portion are all formed of one homogeneous piece of sheet material, and said deformities comprise a plurality of corrugations.

5. The container of claim 1 wherein said third portion is formed from a separate piece of sheet material.

6. The container of claim 1 wherein said shell has a tapered shape which has a larger cross sectional area at said top portion and a smaller cross sectional area at said

bottom portion, said shell further including an outwardly rolled rim along said top portion.

7. A thermally insulated container, comprising:

an outer shell which forms an outer layer of said container;

an inner shell concentrically positioned within said outer shell, said inner shell forming an inner layer of said container;

a middle layer which is sandwiched between said outer shell and said inner shell, said middle layer having plural distortions that provide air space between said outer and said inner shells; and

a bottom closure attached to a bottom portion of said inner shell;

said outer shell, said middle layer, and said inner shell being all formed of an elongated sheet having first and second portions, and a distorted portion which has opposite sides, said first and second portions being folded over said opposite sides of said distorted portion, respectfully, such that said elongated sheet is folded;

whereby said outer shell, said middle layer, and said inner shell cooperate to define said air space therebetween for providing thermal insulation for any material disposed within said container.

8. The container of claim 7 wherein said elongated sheet is homogeneous and comprises essentially paper.

9. The container of claim 7 wherein said elongated sheet is homogeneous and comprises essentially paper, said distorted portion is positioned at one end of said first and second portions, and said first and second portions are relatively smooth.

10. The container of claim 7 wherein said elongated sheet is homogeneous and comprises essentially paper, said distorted portion is positioned between said first and second portions, and said first and second portions are relatively smooth.

11. The thermally insulated container of claim 7 wherein said first and second portions are each arcuate shaped so as to form tapered inner and outer shells.

12. The thermally insulated container of claim 7 wherein said inner and outer shells are substantially cylindrical, said elongated sheet is homogenous, and said distortions comprise a plurality of ridges.

13. A method of making a thermally insulated container, comprising the steps of:

providing a bottom closure;

providing a sheet having first and second portions of a predetermined size for forming respective inner and outer layers of said container, and a third portion which has opposite sides and plural deformities integrally formed therein for cooperating with said inner and outer layers to provide plural air spaces therebetween;

folding said first and second portions on opposite sides, respectfully, of said third portion to provide a multi-layered arrangement, said third portion thereby being sandwiched between said first and second portions, said arrangement having opposite end portions;

joining said opposite end portions of said arrangement to form a shell which defines an interior volume and which has top and bottom portions; and

sealing said bottom closure to said bottom portion.

14. The method of claim 13 wherein said sheet is one homogeneous piece comprising essentially paper.

15. The method of claim 13 wherein said sheet is one homogeneous piece comprising essentially paper and said deformities are selected from the group consisting of corrugations, ridges, grooves, and dimples.

16. The method of claim 13 wherein said first and second portions are relatively smooth and arcuate shaped so as to form a tapered shell.

17. The method of claim 13 wherein said third portion is a separate sheet of material.

18. The method of claim 13 wherein said step of folding said first and second portions into a position on opposite sides, respectfully, of said third portion further includes the step of applying a small amount adhesive between said first and

second portions of a sufficient quantity to hold said first and second portions on said opposite sides, respectively, of said third portion.

19. A method for making a thermally insulated container comprising the steps of:

cutting from sheet material having inner and outer surfaces an elongated container sidewall blank having top and bottom edges and defining first and second continuous sections;

forming on said second section a multiplicity of indentations in said outer surface thereof and a multiplicity of protrusions equal in number to said indentations on said inner surface thereof;

folding said first and second portions about a common fold line to bring the protrusions on the inner surface of second section into face-to-face engagement with the inner surface of said first section to form a multi-layered container-blank having one end portion defined by said common fold line and another end portion opposite said one end portion;

bringing said other end portion into overlapping engagement with said one end portion;

joining said other end portion to said one end portion to form a continuous sidewall blank;

attaching a container bottom closure; and

sealing a bottom portion of said sidewall blank to said bottom closure.

20. The method of claim 19 wherein said step of forming comprises scoring said outer surface.

21. The method of claim 19 wherein said step of forming comprises embossing.

22. The method of claim 19 wherein said step of forming comprises corrugating.

23. The method of claim 19 wherein the steps of cutting and forming are simultaneously performed.

24. A thermally insulated container, comprising:

an outer shell which forms an outer layer of said container;

a substantially smooth inner shell concentrically positioned within said outer shell,

said inner shell forming an inner layer of said container;

said outer shell having distortions that create plural air spaces between said outer shell and said inner shell; and

a bottom closure attached to a bottom portion of said inner shell;

said outer shell and said inner shell being both formed of one elongated sheet;

said one elongated sheet having a substantially smooth portion which provides said inner shell of said container, and a distorted portion which has opposite sides and which provides said outer shell of said container;

said smooth portion being folded adjacent said distorted portion such that said one elongated sheet is folded;

whereby said outer shell and said inner shell cooperate to define said plural air spaces for providing thermal insulation for any material disposed within said container, yet said container is easy and economical to fabricate.

25. The container of claim 24, further including a waterproof coating disposed on said inner shell and said bottom closure.

26. The container of claim 25 wherein said waterproof coating is a material selected from the group consisting of wax and plastic.

27. The container of claim 24 wherein, in said outer shell, said distortions comprise a plurality of spaced grooves.

28. The container of claim 24, further including a reflective coating disposed on one of said layers for reflecting heat back towards its source.

29. The container of claim 24 wherein said smooth portion and said distorted portion are formed from two separate pieces which are attached together to form said elongated sheet.

30. The container of claim 24 wherein said elongated sheet is homogeneous.

31. A thermally insulated container having an upper end, said upper end having an opening, said container comprising a bottom wall and a continuous sidewall joined to said bottom wall, said sidewall being formed of a single elongated strip of sheet material defining contiguous

inner and outer layers joined together along a common fold line and disposed in face-to-face engagement to each other, one of said layers having integral means defining depressions in a face thereof for cooperating with an associated face of the other of said layers to form a plurality of air spaces between said one layer and said other layer, said continuous sidewall having a side seam partially defined by a marginal portion of one of said layers adjacent said fold line.

32. The container as set forth in Claim 31 wherein said one layer defines a portion of an exterior surface of said container.

33. The container as set forth in Claim 31 wherein said integral means comprises scoring formed in said one layer.

34. The container as set forth in Claim 31 wherein said integral means comprises a plurality of corrugations.

35. A thermally insulated container sidewall, comprising:

a shell formed from an elongated piece of sheet material having a fold line which divides said elongated piece of sheet material into contiguous first and second sections;

said first and second sections being folded about said fold line so that said first and second sections are in face-to-face engagement with each other so as to form said respective first and second layers of said shell;

said second layer having a multiplicity of deformities to provide air space between said first and second layers of said shell.

36. A method of making a thermally insulated container sidewall, comprising the steps of:

providing an elongated piece of sheet material having a fold line which divides said elongated piece of sheet material into contiguous first and second sections;

forming a multiplicity of deformities on said second section;

folding said first and second sections about said fold line to bring said second section into face-to-face engagement with said first section to form a multi-layered sheet arrangement having a first end portion defined by said fold line and a second end portion opposite said first end portion;

bringing said first and second end portions adjacent each other;

attaching said first and second end portions to form a sidewall shell.

37. A thermally insulated container, comprising:

a sidewall enclosure which defines an interior volume, said enclosure having top and bottom portions, with an opening at said top portion; and

a bottom closure which is attached to said bottom portion;

said sidewall enclosure being formed from an elongated piece of sheet material having first and second contiguous sections joined along a fold line, said first and second sections defining inner and outer layers of said enclosure;

said enclosure further including a piece of sheet material having a predetermined size, said piece of sheet material being disposed between said inner and outer layers to provide air space between said inner and outer layers of said sidewall enclosure.

38. A method of making a container, comprising the steps of:

providing a bottom closure;

providing a first piece of sheet material;

providing a second piece of sheet material, said second piece of sheet material being elongated and having a fold line dividing said elongated piece of sheet material into contiguous first and second sections;

attaching said first piece of sheet material to said second section of said second piece of sheet material;

folding said first and second sections about said fold line to bring said first and second sections into face-to-face position with each other to form a multi-layered sidewall blank, and so that said first piece of sheet material is sandwiched between said first and second sections, said multi-layered sidewall blank having opposite end portions;

joining said opposite end portions together to form a sidewall enclosure which defines an interior volume, and which has top and bottom portions; and

sealing said bottom closure to said bottom portion.

39. A thermally insulated container, comprising:

a sidewall enclosure which defines an interior volume, said enclosure having top and bottom portions, with an opening at said top portion, and

a bottom closure which is attached to said bottom portion,

said sidewall enclosure being formed from an elongated piece of sheet material having first and second sections joined along a fold line, said elongated piece of sheet material being folded such that said first section defines an inner layer of said enclosure and said second section defines an outer layer of said enclosure,

said enclosure further including a piece of sheet material having a predetermined size, said piece of sheet material being disposed between said inner and outer layers to form a middle layer which provides air space between said inner and outer layers of said sidewall enclosure.

40. The container of claim 39 wherein said elongated piece of sheet material comprises paper and said middle layer comprises corrugated material.

41. The container of claim 39 wherein said elongated piece of sheet material comprises paper and said middle layer comprises porous material.

42. The container of claim 39 wherein at least one of said layers is comprised of plastic.

43. A method of making a container, comprising the steps of:

providing a bottom closure,

providing a first piece of sheet material,

providing a second piece of sheet material, said second piece of sheet material being elongated and having first and second sections joined along a fold line,

attaching said first piece of sheet material to said second piece of sheet material,

folding said second piece of sheet material about said fold line to bring said first and second sections into relative face-to-face position with each other to form a multi-layered sidewall blank, and so that said first piece of sheet material is sandwiched between said first and second sections, such that said first piece of sheet material forms a middle layer to provide air space between said first and second sections, said multi-layered sidewall blank having opposite end portions,

joining said opposite end portions together to form a sidewall enclosure which defines an interior volume, and which has top and bottom portions, and

sealing said bottom closure to said bottom portion.

44. The method of claim 43 wherein said middle layer comprises corrugated material.

45. The method of claim 43 wherein said middle layer comprises porous material.

46. The method of claim 43 wherein at least one of said layers is comprised of plastic.

47. A thermally insulated container, comprising:
an outer shell which forms an outer layer of said container,
an inner shell concentrically positioned within said outer shell, said inner shell forming an inner layer of said container,
a middle layer sandwiched between said inner and outer shells,
a bottom closure attached to said inner shell,
said outer shell and said inner shell being formed from an elongated sheet having a fold line which divides said sheet into first and second sections, said first and second sections being folded at said fold line such that said first and second sections form said respective inner and outer layers of said container,
said middle layer being formed of insulating material and sandwiched between said inner and outer layers for providing insulation between said inner and outer layers of said container.

48. The container of claim 47 wherein said elongated sheet comprises paper and said middle layer comprises deformed sheet material for providing air space between said inner and outer layers of said container.

49. The container of claim 47 wherein said elongated sheet comprises paper and said middle layer comprises porous material for providing air space between said inner and outer layers of said container.

50. The container of claim 47 wherein at least one of said layers is comprised of plastic.

51. A method of forming a thermally insulated container, comprising:
providing an elongated sheet comprised of paper,
folding said elongated sheet into first and second sections that face each other,

providing a middle layer of insulating material between said first and second sections so that said first and second sections and said middle layer therebetween form a three-layered arrangement,

forming said three-layered arrangement into a substantially cylindrical form such that said first and second sections form respective inner and outer layers of a container sidewall having said middle layer therebetween, and

attaching a bottom closure to one end of said sidewall so as to form a container.

52. The method of claim 51 wherein said middle layer of insulating material is a third section of said elongated sheet and said elongated sheet is folded so that said third section forms said middle layer between said inner and outer layers.

53. The method of claim 51 where said middle layer comprises distorted sheet material to provide air space between said inner and said outer layers.

54. The method of claim 51 wherein said middle layer comprises porous material to provide air space between said inner and outer layers.

55. The method of claim 51 wherein at least one of said layers is comprised of plastic.

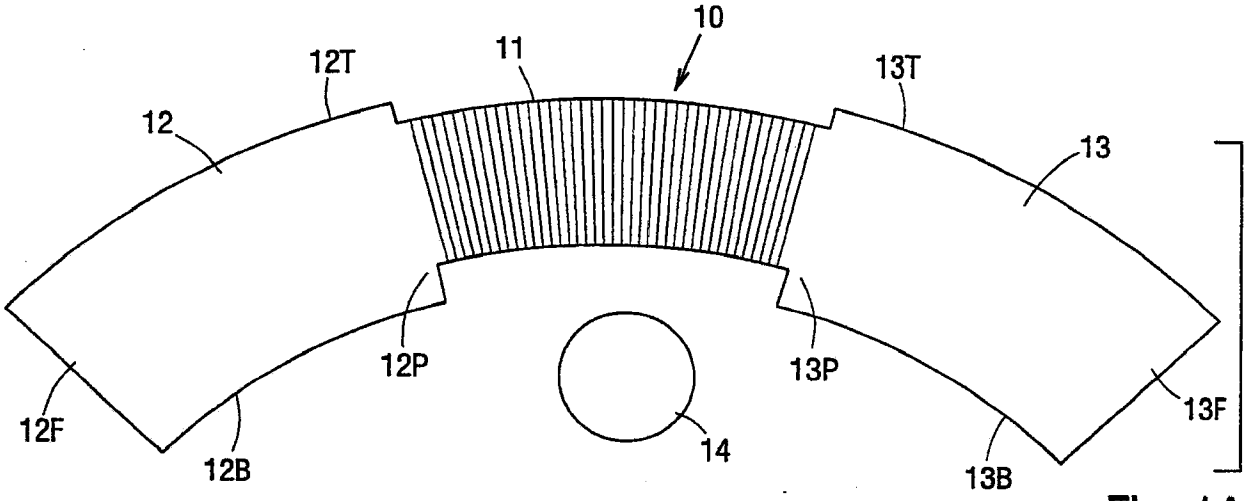


Fig. 1A

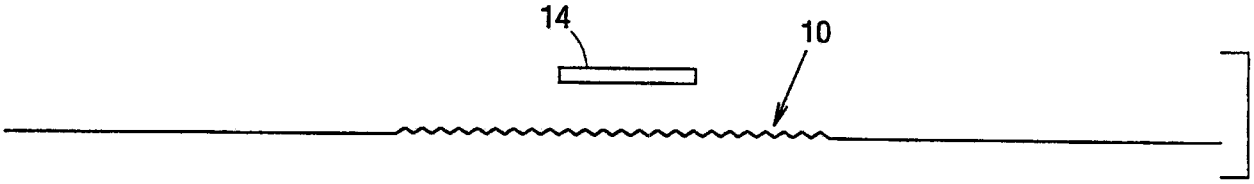


Fig. 1B

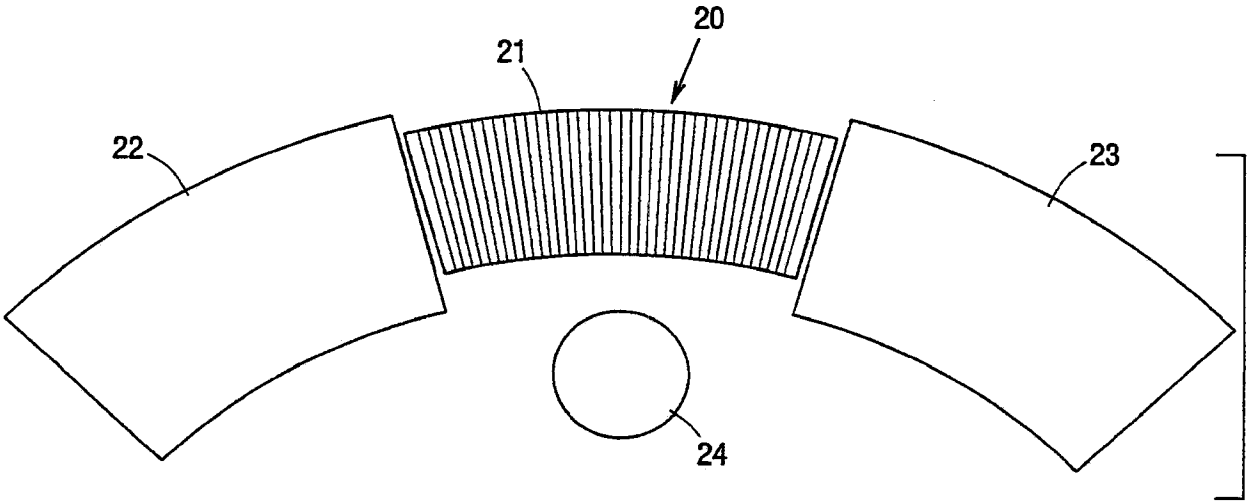


Fig. 1C

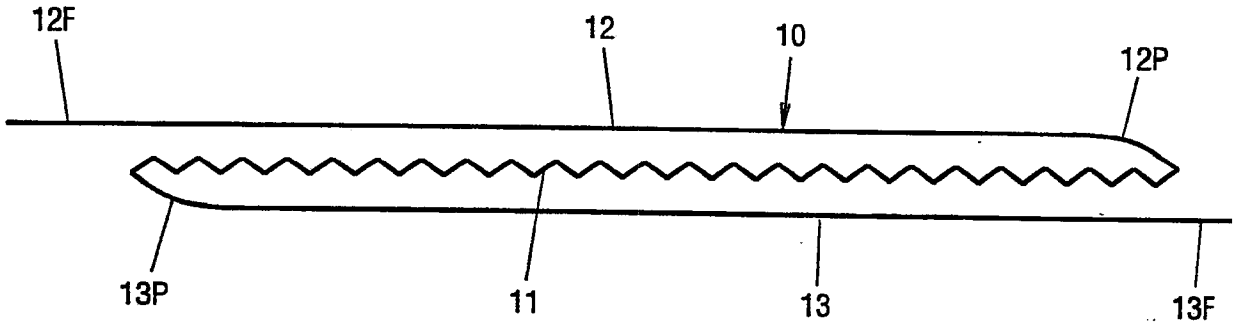


Fig. 2A

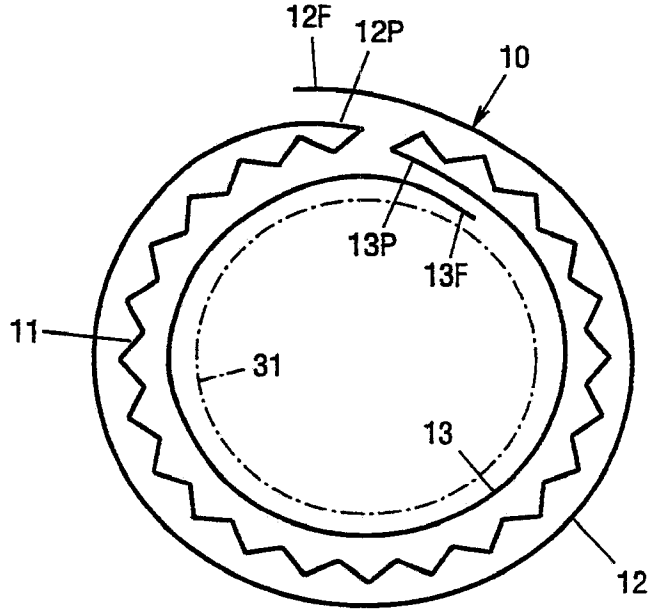


Fig. 2B

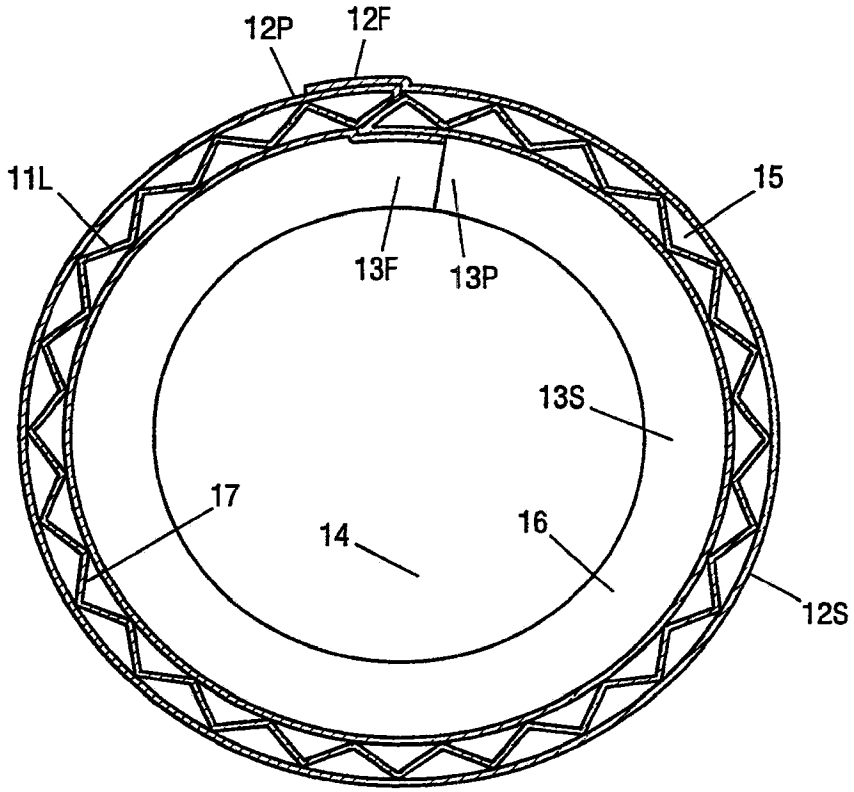


Fig. 3

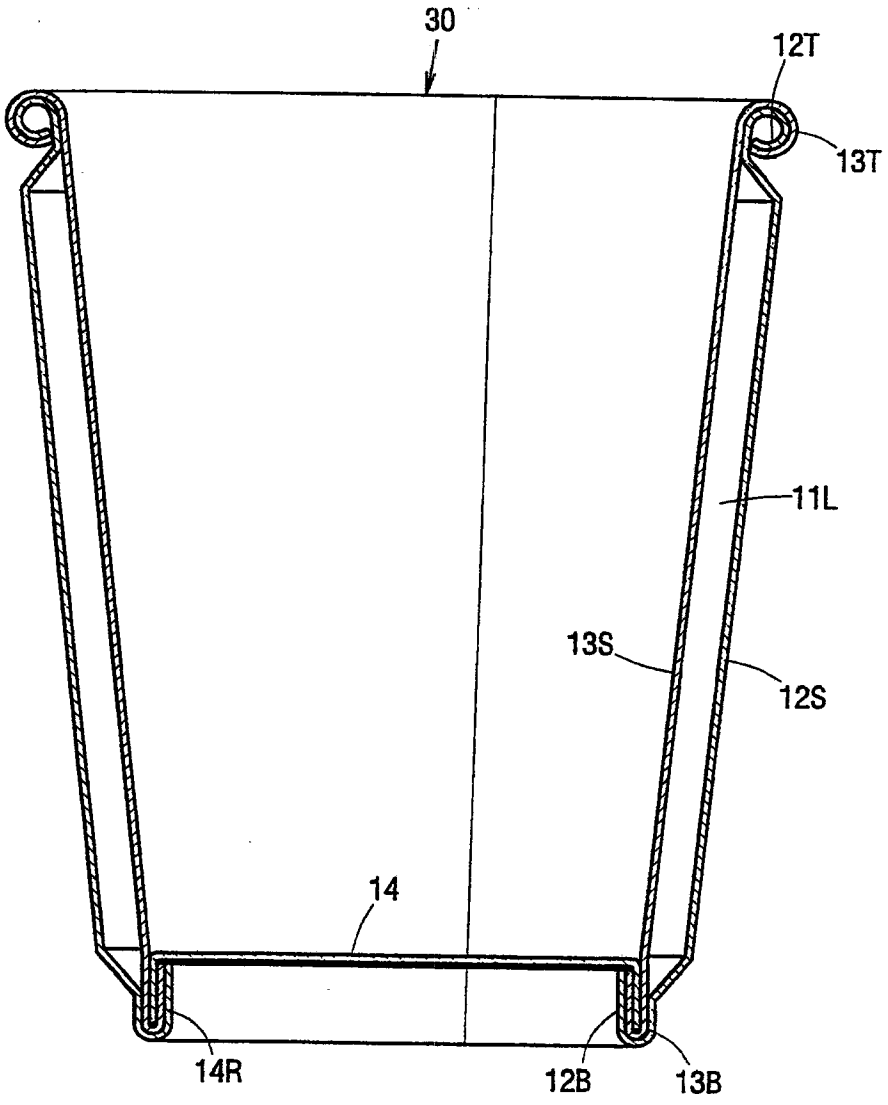


Fig. 4

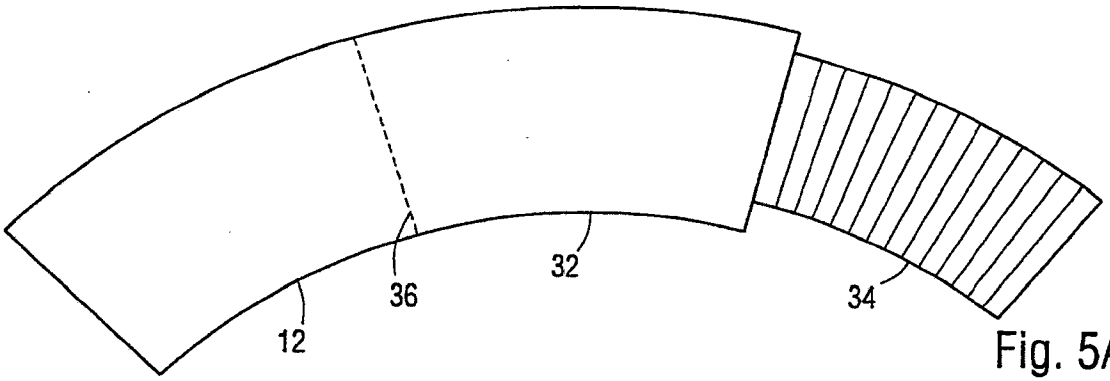


Fig. 5A

Fig. 5B

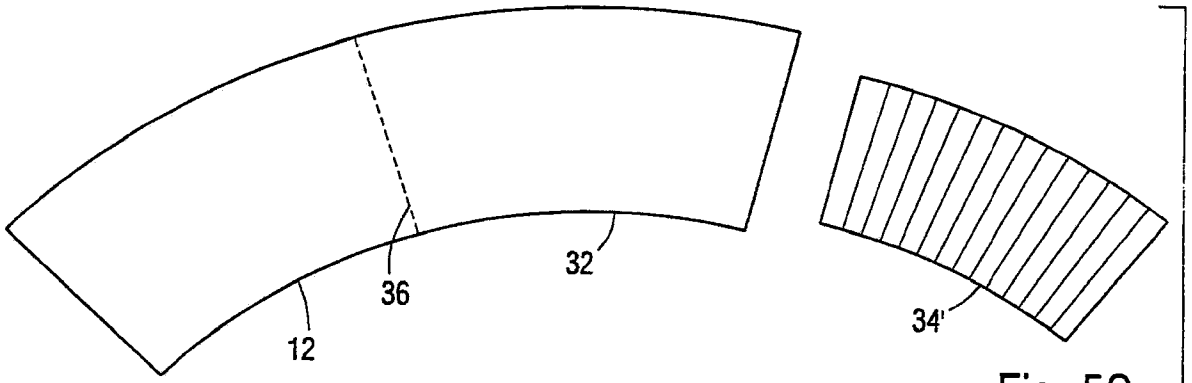


Fig. 5C

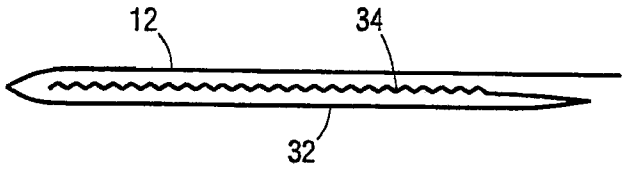


Fig. 6A

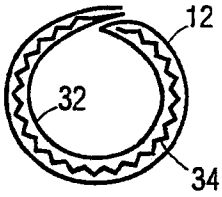


Fig. 6B

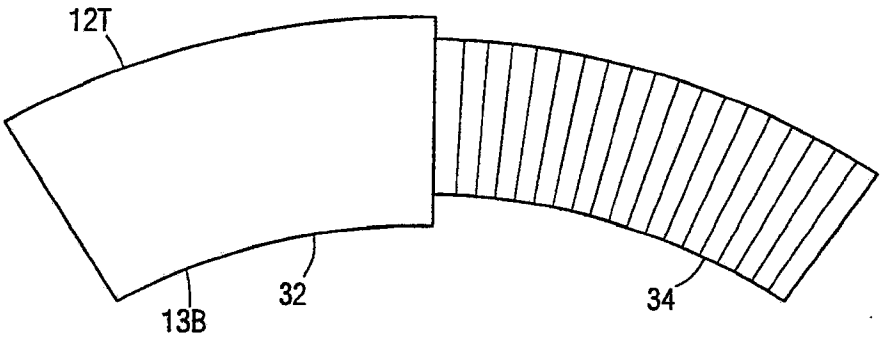


Fig. 7A

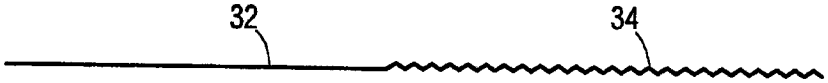


Fig. 7B

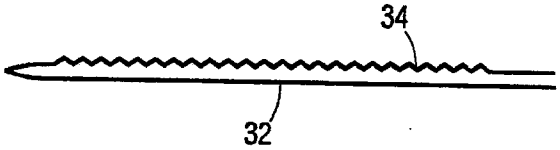


Fig. 8A

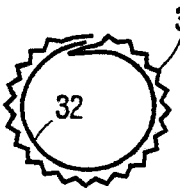


Fig. 8B

Fig. 9